



TITLE:

Quantitative Analysis of Uniaxial Molecular Orientation in Langmuir-Blodgett Films by Infrared Reflection Spectroscopy (INTERFACE SCIENCE - Solutions and Interfaces)

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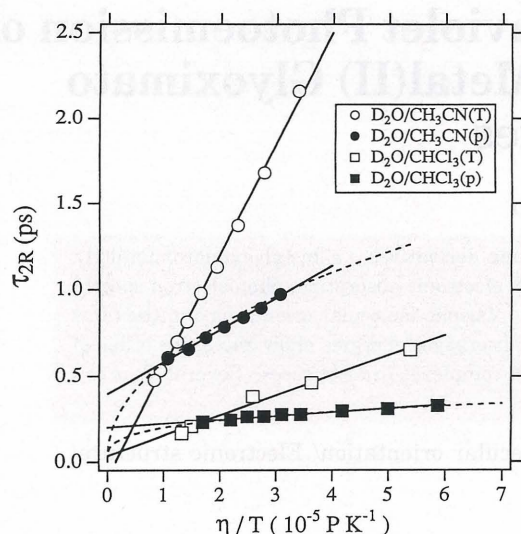


Figure 1. Plots of the rotational correlation times for D_2O in CH_3CN and $CHCl_3$ against solvent viscosity divided by temperature. Open and solid symbols are for temperature- and pressure-variable viscosity variations, respectively. Circles and squares denote D_2O/CH_3CN and $D_2O/CHCl_3$ systems, respectively.

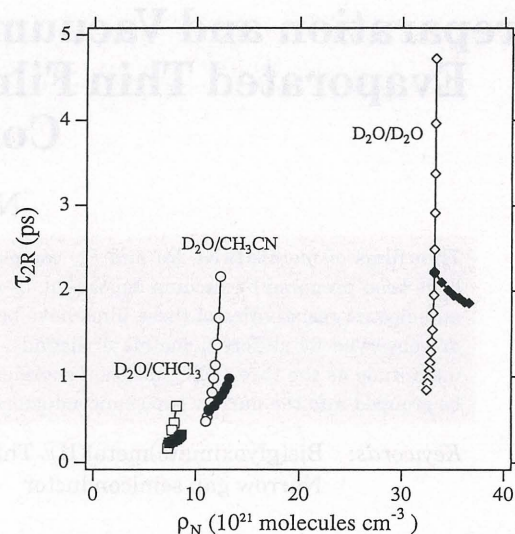


Figure 2. Plots of the rotational correlation times for D_2O in CH_3CN , $CHCl_3$, and pure liquid against the number densities (ρ_N) of the solvents for pressure- (solid symbols) and temperature-variable (open symbols) experiments.

Quantitative Analysis of Uniaxial Molecular Orientation in Langmuir-Blodgett Films by Infrared Reflection Spectroscopy

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A new method for calculating infrared reflection-absorbances of multilayered LB films with a uniaxial anisotropy around the surface normal was developed, to analyze optical properties and molecular orientations in ultrathin films.

Keywords: Molecular orientation/ Langmuir-Blodgett films/ FT-IR external reflection spectra/ Uniaxial anisotropy

With this method, infrared external reflection spectra of a 9-monolayer Langmuir-Blodgett (LB) film of Cd stearate prepared on a GaAs substrate (Figure 1) were analyzed, and the tilting angle of the hydrocarbon chain was obtained as 14° from the surface normal, in fair agreement with that obtained by X-ray diffractometry. Reflection-absorption spectra of the same LB film on a silver-evaporated slide glass at various temperatures were also analyzed by the same method and the orientation angle of each molecular group was obtained, clarifying the process of disordering with the increase of temperature. Further, the dependence of the degree of disordering on the monolayer location in LB films were discussed in light of the isotope substitution experiment [1].

References

1. Hasegawa T, Takeda S, Kawaguchi A and Umemura J, *Langmuir*, **11**, 1236-1243 (1995).

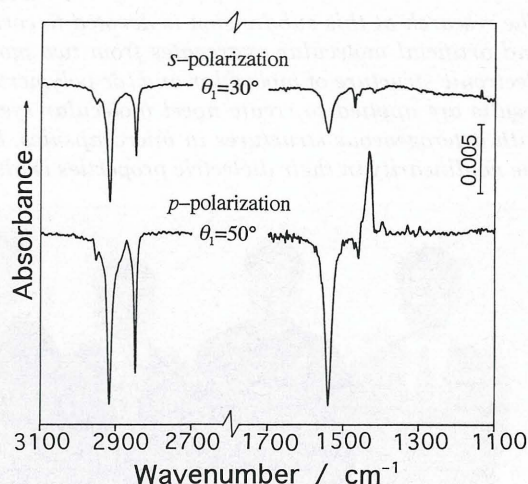


Figure 1. FT-IR external reflection spectra of 9-monolayer LB film of Cd stearate on GaAs.